CLAIMS

What is claimed is:

1. An authentication system comprising:

an input carried by an object;

a reference against which the input is correlated; and

a correlator that correlates the input against the reference to verify whether the input is authentic.

2. The authentication system of claim 1 wherein one of the input and the reference comprises a phase volume mask having a plurality of pairs of phase volume structures.

3. The authentication system of claim 2 wherein the other of the input and reference comprises a spatial light modulator.

4. The authentication system of claim 2 wherein the spatial light modulator comprises a liquid crystal panel having an array of pixels each of whose phase can be selectively varied.

5. The authentication system of claim 4 further comprising a processor operably connected to the liquid crystal panel for controlling the phase of each of its elements.

6. The authentication system of claim 5 wherein the phase of each pixel can be selectively varied from a phase of zero, where light transmittance is a minimum, to a phase of 255, where light transmittance is a maximum.

7. The authentication system of claim 1 wherein the correlator comprises:

a housing;

a light source;

a pair of aperture windows with one of the aperture windows for receiving the input and the other of the aperture windows for receiving the reference wherein the aperture windows are spaced apart so as to space the input a distance from the reference;

a parabolic mirror disposed optically between the light source and the aperture windows;

a beam splitter disposed optically between the parabolic mirror and the aperture windows;

an energy recording device;

a Fourier lens disposed optically between the aperture windows and the energy recording device; and

wherein the light source is carried by the housing and acutely angled relative to the parabolic mirror so as to position the light source inboard of the parabolic mirror, the beam splitter, the Fourier lens, the aperture windows, and the energy recording device.

8. The authentication system of claim 1 wherein the correlator comprises:

a light source that produces a beam of light that illuminates the input and the reference;

an energy recording device disposed optically between 1) the light source and 2) the reference and the input;

a Fourier lens disposed optically between 1) the energy recording device and 2) the reference and the input;

a biometric scanner operably for scanning a biometric feature of a person;

wherein the input and the reference are spaced apart; and

wherein 1) the one of the input and the reference comprises a spatial light modulator that is connected to the biometric scanner for displaying a phase pattern comprising the biometric feature scanned by the biometric scanner and 2) the other of the input and the reference comprises a phase volume mask that includes a biometric pattern phase encoded therein.

9. The authentication system of claim 8 wherein the biometric scanner comprises a fingerprint scanner electrically connected to the spatial light modulator.

10. The authentication system of claim 8 wherein the spatial light modulator comprises the reference and the phase volume mask comprises the input.

11. The authentication system of claim 8 further comprising a beam splitter disposed optically between 1) the light source and 2) the reference and the input.

12. The authentication system of claim 11 wherein the correlator comprises a reflection-mode correlator.

13. The authentication system of claim 8 further comprising

a processor operably connected to the spatial light modulator for providing the spatial light encoder with a random phase pattern that scrambles the scanned biometric pattern and

wherein the phase volume mask further comprises a random phase pattern that scrambles the biometric pattern phase encoded therein.

14. The authentication system of claim 13 wherein the random phase pattern and biometric pattern are convolved to integrate the patterns so that the biometric pattern is scrambled by the random phase pattern such that the biometric pattern cannot be visually discerned when viewing the phase volume mask.

15. The authentication system of claim 7 further comprising a terminal carrying the biometric scanner and a card carrying the phase volume mask wherein the terminal has a slot for receiving at least a portion of the card.

16. The authentication system of claim 1 wherein the correlator further comprises:

a source of light that illuminates the input and the reference;

a scanner assembly that directs a portion of the light to a location exterior of the correlator;

wherein the input is located exteriorly of the correlator such that the input and reference are disposed in different planes; and

wherein the portion of the light is directed onto the input.

17. The authentication system of claim 16 wherein the scanner assembly comprises a beam splitter that splits off the portion of the light.

18. The authentication system of claim 17 wherein the scanner assembly further comprises a mirror optically disposed between the input and the beam splitter for directing the portion of the light toward the input.

19. The authentication system of claim 1

wherein the correlator comprises a source of light that illuminates the input and the reference, a charge-couple-device camera, a Fourier lens disposed between the camera and the input and the reference, a processor operably connected to thecamera for analyzing a joint power spectrum of light from both the input and the reference containing a Fourier interference pattern to determine whether the input is authentic; and

wherein the reference comprises a spatial light modulator that is operably connected to a processor that provides the spatial light modulator with a phase pattern of a plurality of phase patterns stored in a database of phase patterns accessible by the processor.

20. The authentication system of claim 19 wherein the processor operably connected to the camera is also the processor that is operably connected to the spatial light modulator.